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EXAMINER

BERNATZ, KEVIN M

ART UNIT	PAPER NUMBER
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1773

DATE MAILED: 02/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/659,119

Applicant(s)

KAWASAKI ET AL.

Examiner

Kevin M. Bernatz

Art Unit

1773

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-9 and 11-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,3-9 and 11-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date ____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Response to Amendment

1. Amendments to claims 1, 8, 11 and 19, cancellation of claim 10, and addition of claims 20 - 24, filed on December 6, 2005, have been entered in the above-identified application.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Examiner's Comments

3. Applicants' petition to expunge under 27 CFR 1.59(b) filed November 1, 2005 has been received.

Request for Continued Examination

4. The Request for Continued Examination (RCE) under 37 CFR 1.53 (d) filed on December 6, 2005 is acceptable and a RCE has been established. An action on the RCE follows.

Claim Rejections - 35 USC § 112

5. Claims 15 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The terms "substantial portion" in claim 15 and "substantially sulfur-free" in claim 16 are relative terms which render the claims indefinite. These terms are not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. For purposes of evaluating the prior art, the Examiner has given the term(s) the broadest reasonable interpretation(s) consistent with the written description in applicants' specification as it would be interpreted by one of ordinary skill in the art. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997); *In re Donaldson Co., Inc.*, 16 F.3d 1190, 1192-95, 29 USPQ2d 1845, 1848-50 (Fed. Cir. 1994). See MPEP 2111. Specifically, "substantial portion" must be a measurable amount and "substantially sulfur-free" is restricted to impurity-level amounts of sulfur or less.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claims 1, 6, 7 and 11 are rejected under 35 U.S.C. 102(a) and/or (e) as being anticipated by Kamiguchi et al. (U.S. Patent App. No. 2002/0009616 A1).

Regarding claim 1, Kamiguchi et al. disclose a magnetic film comprising Co and Fe (*Figure 1, element 3 and Paragraphs 0088 – 0091 and 0114*), wherein the magnetic film comprises columnar crystals (*Figure 1 and Paragraph 0130*) extending in a film thickness direction (*Figure 1*), wherein a plurality of the columnar crystals are provided adjacent to one another (*ibid*) in a film surface direction with grain boundaries extending in the film thickness direction and separating the columnar crystals (*ibid*).

Regarding the limitation(s) “plated”, the Examiner notes that this limitation(s) are/(is a) process limitation(s) and is/are not further limiting in terms of the structure resulting from the claimed process. Specifically, in a product claim, as long as the prior art product meets the claimed structural limitations, the method by which the product is formed is not germane to the determination of patentability of the product unless an unobvious difference can be shown to result from the claimed process limitations. In the instant case, regardless of the method of depositing the film, the resulting structure will be substantially identical in order to meet the claimed limitations – i.e. the film must possess columnar crystals meeting the claimed limitations directed thereto.

Regarding claims 6 and 11, Kamiguchi et al. disclose crystal diameters meeting applicants’ claimed size limitation (*Paragraph 0130*). The Examiner has interpreted the limitation “microcrystal” to require a crystal size of under 1 micron.

Regarding claim 7, Kamiguchi et al. disclose a Ra of a film surface of the plated film meeting applicants’ claimed roughness limitation (*Paragraph 0131*).

8. Claims 1, 6, 11 and 21 are rejected under 35 U.S.C. 102(b) as being anticipated by Hiramoto et al. (U.S. Patent No. 5,849,400).

Regarding claim 1, Hiramoto et al. disclose a magnetic film comprising Co and Fe (*Figure 4, element 31 and col. 13, lines 41 - 45*), wherein the magnetic film comprises columnar crystals (*Figure 4*) extending in a film thickness direction (*ibid*), wherein a plurality of the columnar crystals are provided adjacent to one another (*ibid*) in a film surface direction with grain boundaries extending in the film thickness direction and separating the columnar crystals (*ibid*).

Regarding the limitation(s) "plated", the Examiner notes that this limitation(s) are/(is a) process limitation(s) and is/are not further limiting in terms of the structure resulting from the claimed process. Specifically, in a product claim, as long as the prior art product meets the claimed structural limitations, the method by which the product is formed is not germane to the determination of patentability of the product unless an unobvious difference can be shown to result from the claimed process limitations. In the instant case, regardless of the method of depositing the film, the resulting structure will be substantially identical in order to meet the claimed limitations – i.e. the film must possess columnar crystals meeting the claimed limitations directed thereto.

Regarding claims 6 and 11, Hiramoto et al. disclose crystal diameters meeting applicants' claimed size limitation (*col. 3, lines 23 - 43*). The Examiner has interpreted the limitation "microcrystal" to require a crystal size of under 1 micron.

Regarding claim 21, Hiramoto et al. disclose alloy compositions and coercivity values meeting applicants' claimed limitations (*examples and Tables 4, 5, 17 and 18*).

9. Claims 1, 6 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Funayama et al. (U.S. Patent App. No. 2003/0197982 A1).

Regarding claim 1, Funayama et al. disclose a magnetic film comprising Co and Fe (*Figures 16 and 17; and Paragraphs 0078 – 0082, 0146 – 0151; and 0154 - 0160*), wherein the magnetic film comprises columnar crystals (*Figures 16 and 17; and Paragraphs 0146 - 0151*) extending in a film thickness direction (*ibid*), wherein a plurality of the columnar crystals are provided adjacent to one another (*ibid*) in a film surface direction with grain boundaries extending in the film thickness direction and separating the columnar crystals (*ibid*).

Regarding the limitation(s) “plated”, the Examiner notes that this limitation(s) are/(is a) process limitation(s) and is/are not further limiting in terms of the structure resulting from the claimed process. Specifically, in a product claim, as long as the prior art product meets the claimed structural limitations, the method by which the product is formed is not germane to the determination of patentability of the product unless an unobvious difference can be shown to result from the claimed process limitations. In the instant case, regardless of the method of depositing the film, the resulting structure will be substantially identical in order to meet the claimed limitations – i.e. the film must possess columnar crystals meeting the claimed limitations directed thereto.

Regarding claims 6 and 11, Funayama et al. disclose crystal diameters meeting applicants' claimed size limitation (*Paragraph 0150*). The Examiner has interpreted the limitation "microcrystal" to require a crystal size of under 1 micron.

Claim Rejections - 35 USC § 103

10. Claims 3 – 5 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hiramoto et al. as applied above in Paragraph 7, and further in view of Sasaki et al. (U.S. Patent App. No. 2003/0206369 A1).

Hiramoto et al. is relied upon as described above.

Hiramoto et al. fail to disclose a magnetic CoFe film meeting applicants' claimed Fe composition.

However, Sasaki et al. teach using a FeCo alloy meeting applicants' claimed composition for a magnetic pole since such an alloy possesses a high saturation magnetization (*Paragraphs 0132 – 0133*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Hiramoto et al. to use a FeCo concentration meeting applicants' claimed limitations as taught by Sasaki et al. since such an alloy possesses a high saturation magnetization.

Regarding claim 22, Hiramoto et al. disclose controlling the coercivity to within applicants' claimed range (*Tables 4, 5, 17 and 18*).

11. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiramoto et al. in view of Sasaki et al. as applied above in Paragraph 9, and further in view of Osaka et al. (U.S. Patent No. 6,6063,512).

Hiramoto et al. and Sasaki et al. are relied upon as described above.

Neither Hiramoto et al. nor Sasaki et al. disclose controlling the film stress to within applicants' claimed range.

However, Osaka et al. teach the importance of minimizing the film stress of a soft magnetic alloy for use in a magnetic head in order to insure a film of uniform quality (*col. 5, lines 55 – 62 and col. 7, lines 39 - 45*). The Examiner deems that it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a results effective variable such as the magnitude of the film stress through routine experimentation, especially given the teaching in Osaka et al. regarding the desire to minimize the film stress to insure a film of uniform quality. *In re Boesch*, 205 USPQ 215 (CCPA 1980); *In re Geisler*, 116 F. 3d 1465, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Aller*, 220 F.2d, 454, 456, 105 USPQ 233, 235 (CCPA 1955).

12. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiramoto et al. as applied above in Paragraph 7, and further in view of Sato et al. (U.S. Patent App. No. 2003/0151851 A1).

Hiramoto et al. is relied upon as described above.

Hiramoto et al. fail to disclose a surface roughness meeting applicants' claimed limitations.

However, Sato et al. teach that it is known to form pole pieces of FeCo material to possess surface roughness values meeting applicants' claimed limitations in order to insure that the surface is sufficiently flat for use as a pole piece in a thin-film magnetic head (*Paragraphs 0102 and 0145*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Hiramoto et al. to use a FeCo layer meeting applicants' claimed surface roughness limitations as taught by Sato et al. since such a surface roughness is necessary to insure that the FeCo material is sufficiently flat for use as a pole piece in a thin-film magnetic head.

13. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hiramoto et al. as applied above in Paragraph 7, and further in view of Komuro et al. (U.S. Patent No. 6,034,847).

Hiramoto et al. is relied upon as described above.

Hiramoto et al. fail to disclose a specific resistance meeting applicants' claimed limitations.

However, Komuro et al. teach the importance of controlling the resistivity (i.e. the specific resistance) of a soft magnetic film for use in a magnetic head application to within applicants' claimed range in order to insure improved radio frequency performance (*abstract; col. 2, lines 32 – 37; and col. 3, line 46 bridging col. 4, line 2*). The Examiner deems that it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a results effective variable such as the

specific resistance/resistivity through routine experimentation, especially given the teaching in Komuro et al. regarding the desire to possess resistance values meeting applicants' claimed limitations in order to insure improved radio frequency performance.

14. Claims 8, 9 and 12 – 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshikawa et al. (U.S. Patent No. 6,132,892) in view of Hitachi, LTD (JP 62-226413 A), Hiramoto et al. ('400) and Sato et al. ('851 A1).

Regarding claim 8, Yoshikawa et al. disclose a thin film magnetic head (*Figure 10*) comprising a lower core layer (*element 27*), an upper core layer (*element 34*) and a magnetic pole portion (*elements 33/30/35/33*) located between the lower core layer and the upper core layer, wherein the magnetic pole portion has a width dimension in a track-width direction less than that of the lower core layer and the upper core layer (*Figure 10*), wherein the magnetic pole portion comprises one of

a) a lower magnetic pole layer (*element 33 of portion 27a*) adjacent the lower core layer, and upper pole layer (*element 33 of portion 31a*) adjacent the upper core layer and a gap layer (*element 30*) located between the lower magnetic pole layer and the upper magnetic pole layer, or

b) an upper magnetic pole layer (*element 33 of portion 31a*) adjacent the upper core layer and a gap layer (*element 30*) located between the upper magnetic pole layer and the lower core layer,

wherein one or both the upper magnetic pole layer and the lower magnetic pole layer comprises a magnetic film comprising Co and Fe (*col. 6, lines 10 – 30; col. 11, lines 35 – 55; col. 12, lines 49 – 59; and col. 15, line 12 bridging col. 17, line 27*).

Regarding the limitation(s) “plated”, the Examiner notes that this limitation(s) are/(is a) process limitation(s) and is/are not further limiting in terms of the structure resulting from the claimed process. Specifically, in a product claim, as long as the prior art product meets the claimed structural limitations, the method by which the product is formed is not germane to the determination of patentability of the product unless an unobvious difference can be shown to result from the claimed process limitations. In the instant case, regardless of the method of depositing the film, the resulting structure will be substantially identical in order to meet the claimed limitations – i.e. the film must possess columnar crystals meeting the claimed limitations directed thereto.

Yoshikawa et al. fail to teach a FeCo film meeting applicants’ claimed columnar structure limitations for use as one or both of the magnetic pole portions.

However, Hitachi, LTD teach that columnar magnetic films including Fe and Co can be used as a magnetic pole portion of a magnetic head in order to provide high magnetic flux for high density recording (*Abstract Translation*). Furthermore, Hiramoto et al. provides an explicit teaching of columnar FeCo alloys, wherein the columnar structure extends in the film thickness direction (*Figure 4 and col. 15, lines 1 - 17*), wherein the disclosed alloys possess excellent corrosion resistance, heat treatment stability and soft magnetic properties (*col. 3, lines 13 – 23*).

It would, therefore, have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Yoshikawa et al. to use a columnar FeCo alloy meeting applicants' claimed columnar structure limitations as taught by JP '413 A and Hiramoto et al., since such an alloy can possess excellent corrosion resistance, heat treatment stability and soft magnetic properties.

None of the above disclose a surface roughness meeting applicants' claimed limitations.

However, Sato et al. teach that it is known to form pole pieces of FeCo material to possess surface roughness values meeting applicants' claimed limitations in order to insure that the surface is sufficiently flat for use as a pole piece in a thin-film magnetic head (*Paragraphs 0102 and 0145*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Yoshikawa et al. in view of JP '413 A and Hiramoto et al. to use a FeCo layer meeting applicants' claimed surface roughness limitations as taught by Sato et al. since such a surface roughness is necessary to insure that the FeCo material is sufficiently flat for use as a pole piece in a thin-film magnetic head.

Regarding claims 9 and 18, Hiramoto et al. disclose crystal diameters meeting applicants' claimed size limitation (*col. 3, lines 23 - 43*). The Examiner has interpreted the limitation "microcrystal" to require a crystal size of under 1 micron.

Regarding claims 12 – 17, these limitations are process limitations and are deemed met for the same reasons that the process limitation "plated" is met. I.e. the

process limitations do not appear to result in an unobvious difference in structure between the claimed and disclosed *product*.

Regarding claim 19, Yoshikawa et al. teach using Fe-rich FeCo alloys possessing bcc crystal structures, since such a crystal structure results in large magnetic flux density and large saturation magnetization (*col. 6, lines 10 – 20; col. 11, lines 35 – 55; and col. 12, lines 49 – 59*).

15. Claim 20 rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshikawa et al. in view of Hitachi, LTD, Hiramoto et al. and Sato et al. as applied above in Paragraph 13, and further in view of Moran (U.S. Patent No.6,574,854 B1).

Yoshikawa et al., JP '413 A, Hiramoto et al. and Sato et al. are relied upon as described above.

None of the above disclose a plated NiP film as the gap layer.

However, Moran teaches using a plated NiP film as the gap layer of a magnetic head in order to produce a gap having reduced curvature (*Abstract and col. 3, lines 28 – 32*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Yoshikawa et al. in view of Hitachi, LTD (JP '413 A), Hiramoto et al. and Sato et al. to utilize a plated NiP film as taught by Moran, since such a film will produce a gap having reduced curvature.

16. Claims 3 – 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Funayama et al. as applied above in Paragraph 8, and further in view of Sasaki et al. ('369 A1).

Funayama et al. fail to disclose using a FeCo alloy meeting applicants' claimed Fe concentration.

However, Sasaki et al. teach using a FeCo alloy meeting applicants' claimed composition for a magnetic pole since such an alloy possesses a high saturation magnetization (*Paragraphs 0132 – 0133*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Funayama et al. to use a FeCo concentration meeting applicants' claimed limitations as taught by Sasaki et al. since such an alloy possesses a high saturation magnetization.

17. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Funayama et al. in view of Sasaki et al. as applied above in Paragraph 16, and further in view of Hiramoto et al. ('400) and Okada et al. ('503 A1).

Funayama et al. and Sasaki et al. are relied upon as described above.

Neither Funayama et al. nor Sasaki et al. disclose films meeting applicants' claimed coercivity limitations.

However, Hiramoto et al. teach columnar FeCo alloys for use in magnetic head applications possessing coercivities meeting applicants' claimed values, but does not explicitly provide a motivation as to why such coercivity values are desired. The

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Examiner notes that Okada et al. teach that low coercivity values are important for magnetic head applications "in order to observantly keep pace with changes in induced current due to recording current" (*Paragraph 0005*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Funayama et al. in view of Sasaki et al. to possess coercivity values meeting applicants' claimed magnitude limitations as taught by Hiramoto et al. and Okada et al., since low coercivity values are important for magnetic head applications "in order to observantly keep pace with changes in induced current due to recording current".

18. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funayama et al. in view of Sasaki et al. as applied above in Paragraph 16, and further in view of Osaka et al. ('512).

Funayama et al. and Sasaki et al. are relied upon as described above.

Neither Funayama et al. nor Sasaki et al. disclose controlling the film stress to within applicants' claimed range.

However, Osaka et al. teach the importance of minimizing the film stress of a soft magnetic alloy for use in a magnetic head in order to insure a film of uniform quality (*col. 5, lines 55 – 62 and col. 7, lines 39 - 45*). The Examiner deems that it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a results effective variable such as the magnitude of the film stress through routine

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experimentation, especially given the teaching in Osaka et al. regarding the desire to minimize the film stress to insure a film of uniform quality.

19. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funayama et al. as applied above in Paragraph 8, and further in view of Sato et al. ('851 A1).

Funayama et al. is relied upon as described above.

Funayama et al. fail to disclose a surface roughness meeting applicants' claimed limitations.

However, Sato et al. teach that it is known to form pole pieces of FeCo material to possess surface roughness values meeting applicants' claimed limitations in order to insure that the surface is sufficiently flat for use as a pole piece in a thin-film magnetic head (*Paragraphs 0102 and 0145*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Funayama et al. to use a FeCo layer meeting applicants' claimed surface roughness limitations as taught by Sato et al. since such a surface roughness is necessary to insure that the FeCo material is sufficiently flat for use as a pole piece in a thin-film magnetic head.

20. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Funayama et al. as applied above in Paragraph 7, and further in view of Komuro et al. ('847).

Funayama et al. is relied upon as described above.

Funayama et al. fail to disclose a specific resistance meeting applicants' claimed limitations.

However, Komuro et al. teach the importance of controlling the resistivity (i.e. the specific resistance) of a soft magnetic film for use in a magnetic head application to within applicants' claimed range in order to insure improved radio frequency performance (*abstract; col. 2, lines 32 – 37; and col. 3, line 46 bridging col. 4, line 2*). The Examiner deems that it would have been obvious to one having ordinary skill in the art to have determined the optimum value of a results effective variable such as the specific resistance/resistivity through routine experimentation, especially given the teaching in Komuro et al. regarding the desire to possess resistance values meeting applicants' claimed limitations in order to insure improved radio frequency performance.

21. Claims 8, 9 and 12 – 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshikawa et al. ('892) in view of Hitachi, LTD (JP 62-226413 A), Funayama et al. ('400) and Sato et al. ('851 A1).

Regarding claim 8, Yoshikawa et al. disclose a thin film magnetic head (*Figure 10*) comprising a lower core layer (*element 27*), an upper core layer (*element 34*) and a magnetic pole portion (*elements 33/30/35/33*) located between the lower core layer and

the upper core layer, wherein the magnetic pole portion has a width dimension in a track-width direction less than that of the lower core layer and the upper core layer (*Figure 10*), wherein the magnetic pole portion comprises one of

a) a lower magnetic pole layer (*element 33 of portion 27a*) adjacent the lower core layer, and upper pole layer (*element 33 of portion 31a*) adjacent the upper core layer and a gap layer (*element 30*) located between the lower magnetic pole layer and the upper magnetic pole layer, or

b) an upper magnetic pole layer (*element 33 of portion 31a*) adjacent the upper core layer and a gap layer (*element 30*) located between the upper magnetic pole layer and the lower core layer,

wherein one or both the upper magnetic pole layer and the lower magnetic pole layer comprises a magnetic film comprising Co and Fe (*col. 6, lines 10 – 30; col. 11, lines 35 – 55; col. 12, lines 49 – 59; and col. 15, line 12 bridging col. 17, line 27*).

Regarding the limitation(s) “plated”, the Examiner notes that this limitation(s) are/(is a) process limitation(s) and is/are not further limiting in terms of the structure resulting from the claimed process. Specifically, in a product claim, as long as the prior art product meets the claimed structural limitations, the method by which the product is formed is not germane to the determination of patentability of the product unless an unobvious difference can be shown to result from the claimed process limitations. In the instant case, regardless of the method of depositing the film, the resulting structure will be substantially identical in order to meet the claimed limitations – i.e. the film must possess columnar crystals meeting the claimed limitations directed thereto.

Yoshikawa et al. fail to teach a FeCo film meeting applicants' claimed columnar structure limitations for use as one or both of the magnetic pole portions.

However, Hitachi, LTD teach that columnar magnetic films including Fe and Co can be used as a magnetic pole portion of a magnetic head in order to provide high magnetic flux for high density recording (*Abstract Translation*). Furthermore, Funayama et al. provides an explicit teaching of columnar FeCo alloys, wherein the columnar structure extends in the film thickness direction (*Paragraph 0154 – 1060 and Figure 16*), wherein the disclosed alloys possess advantageous soft magnetic properties (*Paragraphs 0018 – 0042*).

It would, therefore, have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Yoshikawa et al. to use a columnar FeCo alloy meeting applicants' claimed columnar structure limitations as taught by JP '413 A and Funayama et al., since such an alloy can provide advantageous soft magnetic properties, such as a high magnetic flux for high density recording.

None of the above disclose a surface roughness meeting applicants' claimed limitations.

However, Sato et al. teach that it is known to form pole pieces of FeCo material to possess surface roughness values meeting applicants' claimed limitations in order to insure that the surface is sufficiently flat for use as a pole piece in a thin-film magnetic head (*Paragraphs 0102 and 0145*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Yoshikawa et al. in view of JP '413 A and Funayama et al. to use a FeCo layer meeting applicants' claimed surface roughness limitations as taught by Sato et al. since such a surface roughness is necessary to insure that the FeCo material is sufficiently flat for use as a pole piece in a thin-film magnetic head.

Regarding claims 9 and 18, Funayama et al. disclose crystal diameters meeting applicants' claimed size limitation (*Paragraph 0150*). The Examiner has interpreted the limitation "microcrystal" to require a crystal size of under 1 micron.

Regarding claims 12 – 17, these limitations are process limitations and are deemed met for the same reasons that the process limitation "plated" is met. I.e. the process limitations do not appear to result in an unobvious difference in structure between the claimed and disclosed *product*.

Regarding claim 19, Yoshikawa et al. teach using Fe-rich FeCo alloys possessing bcc crystal structures, since such a crystal structure results in large magnetic flux density and large saturation magnetization (*col. 6, lines 10 – 20; col. 11, lines 35 – 55; and col. 12, lines 49 – 59*).

22. Claim 20 rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshikawa et al. in view of Hitachi, LTD, Funayama et al. and Sato et al. as applied above in Paragraph 21, and further in view of Moran ('854 B1).

Yoshikawa et al., JP '413 A, Funayama et al. and Sato et al. are relied upon as described above.

None of the above disclose a plated NiP film as the gap layer.

However, Moran teaches using a plated NiP film as the gap layer of a magnetic head in order to produce a gap having reduced curvature (*Abstract and col. 3, lines 28 – 32*).

It would therefore have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the device of Yoshikawa et al. in view of Hitachi, LTD (JP '413 A), Funayama et al. and Sato et al. to utilize a plated NiP film as taught by Moran, since such a film will produce a gap having reduced curvature.

Response to Arguments

23. The rejection of claims 1, 6, 7 and 11 under 35 U.S.C § 102(a) and/or 102(e) – Kamiguchi et al.

24. The rejection of claims 1, 3 – 9 and 11 - 24 under 35 U.S.C § 102(b) and/or 103(a) – Hiramoto et al., alone or combined with various references

Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

25. The rejection of claims 15 and 16 under 35 U.S.C § 112 2nd Paragraph

Applicant(s) argue(s) that one of ordinary skill in the art would comprehend the scope of claims 15 and 16, relying upon additional “relative terms” to define the relative term limitation in the claim (*page 6 of response*). The examiner respectfully disagrees.

The terms “are primarily in the state of Fe^{2+} ”, “is easily taken into the magnetic pole layers”, “contain a large amount” are all relative terms. While the Examiner agrees with applicants that “those skilled in the art of plating processes will fully comprehend the relative amount of Fe^{2+} that can be incorporated into a magnetic film using the described plating process”, the Examiner notes that applicants key word in the above sentence is *can*. While one skilled in the art may be able to appreciate a maximum amount of Fe^{2+} that could be incorporated, the Examiner deems that they would *not* be able to determine which value below that maximum would be the “cut-off” for reading on “a substantial portion”. Is 50% a “substantial portion”? 51%? 90%? Since “substantial portion” is not defined in the specification, one of ordinary skill would not be readily appraised of what portion would constitute infringement of the claimed invention.

Regarding the argument directed to the sulfur content, applicants state “the Applicants describe that the magnetic film of the present invention does not contain sulfur” (*page 7 of response*), but again then argue with relative terms such as “essentially no sulfur or sulfur at an essentially undetectable concentration level”. The scope of “does not contain sulfur” is clear and definite. The scope of “substantially sulfur-free” (or any of the equivalent terms argued by applicants) is not clear and

definite, since one of ordinary skill in the art would not be able to appreciate what values of a sulfur content would constitute infringement. 1% sulfur? 0.025%? 8%?

26. The rejection of claims 1, 3 – 9 and 11 - 24 under 35 U.S.C § 102(e) and/or 103(a) – Funayama et al., alone or combined with various references

Applicant(s) argue(s) that Funayama et al. does not disclose columnar crystals that are adjacent to each other, nor that Funayama et al. disclose a CoFe film, but instead they disclose a NiFe film (*page 7 of response*). Finally applicants argue alleged unexpected results with respect to improved surface roughness (*page 8 of response*), hence leading to patentability. The examiner respectfully disagrees.

First, the Examiner notes that “adjacent” does not preclude additional layers between located therebetween, since applicants’ claims are open to additional elements. Should applicants wish to exclude additional layers being present in between the crystal grains, applicants are suggested to utilize the language “directly adjacent”. Second, the Examiner notes that Funayama et al. explicitly teach that the nonmagnetic material separating the grains in Figure 17 is *optional* (*Paragraph 0154 – “If a non-magnetic material is precipitated into the gaps...”*). While Funayama et al. may disclose an example using NiFe as the magnetic material forming columnar crystals without a non-magnetic material in the gaps, the Examiner notes that the rejection is based on the entire reference(s) and not just a piece meal analysis of the cited reference(s). In the instant case, Funayama et al. clearly disclose that any soft magnetic alloy, including FeCo alloys, are suitable for use as the disclosed films.

Finally, applicant(s) are reminded that **a detailed description of the reasons and evidence** supporting a position of unexpected results must be provided **by applicant(s)**. A mere pointing to data requiring the examiner to ferret out evidence of unexpected results **is not sufficient** to prove that the results would be truly unexpected to one of ordinary skill in the art. *In re D'Ancicco*, 439 F.2d 1244, 1248, 169 USPQ 303, 306 (1971) and *In re Merck & Co*, 800 F.2d 1091, 1099, 231 USPQ 375, 381 (Fed. Cir. 986). In addition, the Examiner notes that applicants' claims do not appear to be commensurate in scope with the alleged unexpected results since claim 1 does not even recite a surface roughness limitation.

Conclusion

27. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yoshikawa et al. ('892) teach granular FeCo alloys meeting applicants' claimed composition limitations for use in magnetic head applications (*entire disclosure*).

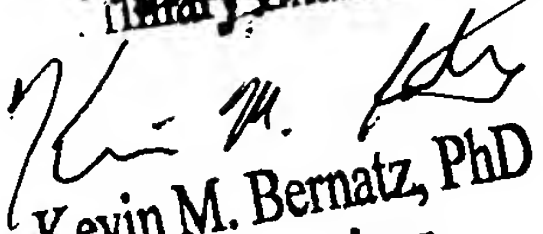
28. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin M. Bernatz whose telephone number is (571) 272-1505. The examiner can normally be reached on M-F, 9:00 AM - 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Carol Chaney can be reached on (571) 272-1284. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Art Unit: 1773

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KMB
February 3, 2006


Kevin M. Bernatz, PhD
Primary Examiner